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Interconnection and Network Access

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Abstract

The purpose of this Essay is to focus on the role of market power where interconnection and network access problems are involved. The Essay is organized by parts. Part I sketches the European Union history with respect to open network provision ("ONP") policy. In Part II, the market-share concept of market power applied within Council Directive 97/33, European Community on Interconnection in Telecommunications of June 30, 1997 ("Interconnection Directive") is criticized as an important source for an oversized regulatory basis. Instead, the criteria for an economically justified disaggregated regulatory framework for the ONP concept is pointed out in order to localize the proper regulatory basis. It is shown that the regulatory basis should be restricted to local cable-based networks ("monopolistic bottleneck areas"). Part III explains the role of efficient private bargaining of interconnection/access conditions, as long as monopolistic bottlenecks are absent. Next, Part IV analyzes regulation of interconnection to monopolistic bottlenecks, particularly, the role of the "essential facility" doctrine. Finally, Part V discusses costing and pricing issues of interconnection services within the ONP concept.

III. DEREGULATION IN CONTESTABLE AND NON-CONTESTABLE MARKETS

INTERCONNECTION AND NETWORK ACCESS

*Prof. Dr. Günter Knieps**

INTRODUCTION

Since the beginning of 1998, market entry has been permitted in all subparts of telecommunications networks, including cable-based infrastructure and telephone services, in nearly all European countries. As a consequence, problems of network access as well as network interconnection have gained increased importance. Global entry deregulation, however, does not automatically imply the abolishment of all sector-specific regulation. First, a long-term proper role of government intervention with respect to technical regulations, for example, the coordination and allocation of radio frequencies, the organization of number portability, the design of standards, etc., remains in order to guarantee an adequate framework for a competitive telecommunications sector. Second, politically desired universal service objectives remain to be organized by entry-compatible instruments, for example, a universal service fund. Third, remaining network-specific market power needs to be disciplined by regulatory instruments or competition policy, respectively. Future regulation of costing and pricing of interconnection services is under debate within the individual European countries as well as on the level of the European Union[1] as a whole.

The purpose of this Essay is to focus on the role of market power where interconnection and network access problems are involved.[2] The controversy about the advantages and disadvan-

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1. Treaty on European Union, Feb. 7, 1992, O.J. C 224/1 (1992), [1992] 1 C.M.L.R. 719 [hereinafter TEU] (amending Treaty establishing the European Economic Community, Mar. 25, 1957, 298 U.N.T.S. 11 [hereinafter EEC Treaty], *as amended by* Single European Act, O.J. L 169/1 (1987), [1987] 2 C.M.L.R. 741 [hereinafter SEA]).

2. For the analysis of technical regulations, the reader is referred to GÜNTER

tages of obligations for network interconnection and detailed regulation of tariffs, including control of the underlying cost conditions, is the subject of discussions all over the world.

The Essay is organized by parts. Part I sketches the European Union history with respect to open network provision ("ONP") policy. In Part II, the market-share concept of market power applied within Council Directive 97/33, European Community on Interconnection in Telecommunications of June 30, 1997[3] ("Interconnection Directive") is criticized as an important source for an oversized regulatory basis. Instead, the criteria for an economically justified disaggregated regulatory framework for the ONP concept is pointed out in order to localize the proper regulatory basis. It is shown that the regulatory basis should be restricted to local cable-based networks ("monopolistic bottleneck areas"). Part III explains the role of efficient private bargaining of interconnection/access conditions, as long as monopolistic bottlenecks are absent. Next, Part IV analyzes regulation of interconnection to monopolistic bottlenecks, particularly, the role of the "essential facility" doctrine. Finally, Part V discusses costing and pricing issues of interconnection services within the ONP concept.

I. *EUROPEAN ONP HISTORY IN TELECOMMUNICATIONS*

A. *The Concept of ONP in Partially Entry-Deregulated Markets*

In 1990, the European Union took the first step towards liberalizing telecommunications services by opening the market for value-added network services ("VANS"). At that time, voice telephone service as well as public telecommunications infrastructure networks were still legal monopolies controlled by state-owned enterprises. Establishment of the internal market for these liberalized services within Europe required harmonizing conditions for access to and use of public telecommunications

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KNIEPS, DIE AUSGESTALTUNG DES ZUKÜNFTIGEN REGULIERUNGSRAHMENS FÜR DIE TELEKOMMUNIKATION IN DEUTSCHLAND [THE DESIGN OF THE FUTURE REGULATORY FRAMEWORK FOR GERMAN TELECOMMUNICATIONS], (Diskussionsbeiträge des Instituts für Verkehrswissenschaft und Regionalpolitik [Discussion Paper of the Institut of Transport Economics and Regional Policy] Nr. 22, Universität Freiburg, 1995). The analysis of an entry-compatible alternative to cross-subsidization, the so-called universal service fund, has already been provided in Charles B. Blankart & Günter Knieps, *What Can We Learn from Comparative Institutional Analysis? The Case of Telecommunications*, 42 KYKLOS 579 (1989).

3. Council Directive No. 97/33, O.J. L 199/32 (1997).

networks and services. The ONP concept was introduced in the European Commission's 1987 Green Paper on Telecommunications Services.[4] It was given substance in Council Directive 90/387/EEC of June 28, 1990[5] on the establishment of the internal market for telecommunications services through the implementation of the ONP. Subsequent directives and recommendations applied the principles of the ONP to leased lines, voice telephony, packet switched date services, and integrated services digital networks ("ISDN").[6]

The purpose of the ONP policy during the period of partial entry deregulation was to stimulate entry into the VANS market and to ensure fair competition between VANS suppliers and the VANS operations of the existing telecommunications organizations. Therefore, Article 3 of the Council Directive No. 90/387/EEC[7] laid down the following basic principles with which ONP conditions must comply:

- conditions must be based on objective criteria;
- conditions must be transparent, and published in an appropriate manner; and
- conditions must guarantee equality of access and must be non-discriminatory, in accordance with Community law.[8]

Furthermore, it was explicitly stated that ONP conditions must not restrict access to public telecommunications networks or public telecommunications services, except for reasons based on essential requirements, e.g., security of network operations and maintenance of network integrity. Focusing on the preconditions for competition on the VANS market, only a minimally harmonized offering of those public telecommunications networks and public telecommunications services identified as being in the European interest were required.

European Union's ONP policy may also have been pursued

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4. *See* Commission of the European Communities, Towards a Dynamic European Economy: Green Paper on the Development of the Common Market for Telecommunications Services and Equipment, COM (87) 290 Final (June 1987) [hereinafter Green Paper].

5. Council Directive No. 90/387/EEC, O.J. L 192/1 (1990).

6. For an illustrative survey of these developments, see EUROPEAN COMMISSION, ONP COMMITTEE, REPORT, SUBJECT: REVISION OF THE ONP FRAMEWORK DIRECTIVE ONP, COM 95 (1995).

7. Council Directive No. 90/387/EEC, art. 3, O.J. L 192/1, at 2 (1990).

8. *Id.*

as an instrument to avoid structural separation between the VANS activities of the existing telecommunications organizations and their traditional network activities.[9] Because the established carrier was correctly considered to be a monopolist on a large part of the market, global regulation of market power was still considered to be necessary, but left to the national regulatory authorities.

B. *The Concept of ONP in Globally Entry-Deregulated Markets*

Commission Directive 96/19/EC of March 13, 1996[10]("Full Competition Directive") changed Council Directive 90/387/EEC[11] by abolishing all legal entry barriers, including free entry into the markets for telecommunications services as well as the set-up and provision of telecommunications infrastructure networks. Because the telecommunications infrastructure in Europe is developing towards a set of interconnected networks, owned and operated by many different organizations, the importance of interconnection is significantly increasing. Such interconnection may take place among different providers of long distance networks, among providers of mobile or satellite networks, and public cable-based long distance networks. Interconnection also takes place between long-distance telecommunications service providers to local networks, etc. This changing role of interconnection also has led to a revision of ONP principles.

The basic philosophy behind the European Union ONP policy seems to be that the infrastructure should be open to all users in the European Union, to any service provider, and to any provider of elements of the overall infrastructure. The Full Competition Directive extends ONP principles to the new fully entry-deregulated environment, focusing on interconnection and public switched networks, and amending Commission Directive 90/388/EEC with Articles 4a-4d.[12] In addition to the well-

9. Similar open network provision ("ONP") policies could also be observed in other network industries, for example, railroads and airlines. *See, e.g.*, Günter Knieps, *Wettbewerb in Netzen—Reformpotentiale in den Sektoren Eisenbahn und Luftverkehr* [*Competition in Network Industries—Potentials for Reform in Railroads and Air Transport*] (1996).

10. Commission Directive No. 96/19/EC, O.J. L 74/13 (1996).

11. Council Directive No. 90/387/EEC, O.J. L 192/1 (1990).

12. Commission Directive No. 96/19/EC, art. 1(6), O.J. L 74/13, at 1-2 (1996) (amending Commission Directive No. 90/388/EEC, O.J. L 192/10 (1990) by inserting Art. 4a-4d).

known criteria of non-discriminatory, reasonable, and transparent conditions, the criterion of cost-orientation was explicitly introduced. Priority was given to commercial negotiations between the interconnecting parties involved. The Interconnection Directive[13] that was adopted in June 1997 and scheduled to be implemented into the Member States' national laws by December 31, 1997, goes further than the Full Competition Directive[14] by introducing a two-tiered approach to ONP regulation. Providers of public telecommunications networks or public telecommunications services, which are classified as possessing significant market power, are subjected to more restrictive ONP regulation. Such regulation provides the general obligation to provide network access under Section 4(2) of the Interconnection Directive[15] and to carry the burden of proof that interconnection charges are cost-based, that the principles for cost accounting systems under Section 7(5) of the Interconnection Directive[16] have been followed, and that there is no possibility of *ex ante* regulation of interconnection charges under Section 7(2) of the Interconnection Directive.[17] According to the Interconnection Directive, an organization with a market share of over twenty-five percent in a given telecommunications market is considered to possess a significant market power.[18] Nevertheless, the major responsibility with regard to ONP regulation still has been left in the hands of the national regulatory authorities.

National regulatory agencies have the authority to determine whether an organization has significant market power. According to Section 4(3) of this directive, national regulatory agencies are free to decide whether an organization with more or less than twenty-five percent in a given telecommunications market is to be classified as possessing market power. Moreover, the principles for interconnection charges and cost-accounting systems,[19] including control of whether tariffs are cost-based, are the responsibility of the national regulatory authorities. Thus, the Interconnection Directive laid down the general principles

13. Council Directive No. 97/33, O.J. L 199/32 (1997).
14. Commission Directive No. 96/19/EC, O.J. L 74/13 (1996).
15. Council Directive No. 97/33, art. 4(2), O.J. L 199/32, at 37 (1997).
16. *Id.* art. 7(5), O.J. L 199/32, at 39 (1997).
17. *Id.* art. 7(2), O.J. L 199/32, at 38 (1997).
18. *Id.* art. 4(3), O.J. L 199/32, at 37 (1997).
19. *Id.* art. 7, O.J. L 199/32, at 38-39 (1997).

of future ONP regulation, but left the responsibility for the concrete regulation of interconnection to the regulatory authorities of the individual Member States.[20]

II. *THE APPLICATION OF THE DISAGGREGATED REGULATORY FRAMEWORK TO THE ONP CONCEPT*

The Interconnection Directive introduced the criterion of significant market power into the ONP regulatory debate for the first time. It seems obvious that the criterion of twenty-five percent market share is rather arbitrarily chosen. The national regulatory authorities, however, are currently engaged in the search for sound economic criteria to localize network specific market power as a starting point for remaining sector-specific regulation.

A. *The Necessity of a Symmetric Regulatory Approach*

Symmetric regulatory conditions should neither advantage nor disadvantage the former network monopolist. On the one hand, all monopoly privileges must be abandoned. On the other hand, all one-sided regulatory obligations, for example, to cross-subsidize universal services, must end. "In general terms symmetric regulation means providing all suppliers, incumbents and new entrants alike, a level playing field on which to compete: the same price signals, the same restrictions, and the same obligations . . . . But all forms of asymmetric regulation contain an intrinsic bias toward some firms or technologies . . . ."[21]

Even if one accepts criteria such as relative market share, financial strength, access to input and service markets, etc., as a starting point in order to evaluate the existence of market power, the development of an *ex ante* regulatory criterion creates a need for a more clear-cut definition of market power. Such clear-cut definition is even more important because *Vermutungskriterien*[22] on the basis of market shares can lead to wrong criteria for government intervention in the telecommunications sector.

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20. *Id.* art. 9, O.J. L 199/32, at 39-40 (1997).

21. Mark Schankerman, *Symmetric Regulation for Competitive Telecommunications*, 8 INFO. ECON. & POL'Y 55 (1996).

22. *Vermutungskriterien* roughly translates to criteria that form the basis for an assumption or a logical conclusion.

Therefore, it is important to develop and apply a disaggregated approach of market power regulation. It is necessary to differentiate between the areas where active and potential competition can work and other, so-called monopolistic bottleneck areas where the combination of economies of bundling and irreversible costs caused existing natural monopoly situation. While sunk costs are no longer relevant for the incumbent monopoly's decision-making, the potential entrant is confronted with the decision of whether to build network infrastructure and, thus, spend the irreversible costs. The incumbent firms, therefore, have lower decision-relevant costs than the potential entrants. Such lower decision-relevant costs create the scope for strategic behavior of the incumbent firms, so that inefficient production and monopoly profits will not necessarily result in a market entry. It can be demonstrated that the regulation of market power is only justified in monopolistic bottleneck areas. In all other cases, the existence of active and potential competition will lead to efficient market results as shown on Table One.

Table One: A Disaggregated Approach to Market Power Regulation

Sub-market	With Sunk Costs	Without Sunk Costs
	(1)	(2)
Natural Monopoly (Bundling Advantages)	Regulation of Market Power (Non-Contestable Networks)	Potential Competition (Contestable Networks)
	(3)	(4)
No Natural Monopoly (Bundling Advantages Exhausted)	Competition Among Active Providers	Competition Among Active Providers

The pressure of potential competition alone can create an incentive for the active supplier to improve the quality and variety of services as well as to produce more efficiently. These networks are therefore called contestable.[23] An essential condition for the functioning of potential competition in order to discipline firms already providing network services is that the incumbent firms do not have asymmetric cost advantages in comparison with potential entrants.

23. *See, e.g.*, WILLIAM J. BAUMOL ET AL., CONTESTABLE MARKETS AND THE THEORY OF INDUSTRY STRUCTURE (1982).

An interesting question lies in the relation between "pure economic" analysis and real life networks, including the services that run over them. What about the reality of "contestable networks?" It seems obvious that the behavior of markets for network services, as soon as competition works, becomes more complex as assumed in the "simple" models of the theory of contestable markets. Examples may be the strategies of product differentiation, price differentiation, goodwill, etc. Even strategic behavior on competitive markets for network services, however, should not lead to the opposite conclusion to re-regulate these markets again. In contrast, the very point of the disaggregated approach is the development of the *preconditions* for competition on the markets for network services. The only purpose of the theory of contestable markets is, therefore, to localize the stable network-specific market power that systematically hampers the development of competition on the markets for network services. Whereas strategic behavior and informational problems do not lead to stable market power on the markets for network services, monopolistic bottlenecks—due to sunk costs—do create stable market power even if all market participants are well informed. The development of a set of rules to deal with transactions across the boundary between contestable networks and non-contestable monopolistic bottlenecks is therefore important in order to guarantee the preconditions for competition of the markets for network services.

Illustrative examples for contestable networks are the markets for telecommunications services, which are often provided via service networks. Even the market for public telephone services is contestable because suppliers of value-added services are also prepared to offer telephone services after legal entry barriers disappear. An important condition, however, is the guarantee of number portability. The term "number portability" means the ability of users of telecommunications services to retain, at the same location, the existing telecommunications numbers without impairment of quality, reliability, or convenience when switching from one telecommunications carrier to another. Even if the market shares of incumbent firms were large, inefficient suppliers would then be immediately confronted with rapidly decreasing market shares. But contestable sub-areas can also be localized in the area of telecommunications infrastructure. The pressure of potential competition in wireless net-

works, for example, satellite, microwave systems, and mobile communication, is guaranteed as long as symmetric access to complementary inputs, for example, right of way, radio spectrum, etc., is ensured. More generally, an important condition for the effectiveness of actual and potential competition is that all active and potential suppliers have equal, i.e., symmetric, access to the complementary monopolistic bottleneck.

In contrast, in local cable-based networks, where sunk costs are relevant, consumers, who would intrinsically be willing to switch immediately to less costly firms, cannot do this. Market entry, therefore, cannot be expected easily, if sunk costs are sufficiently high and very relevant. Therefore, we can conclude that sector-specific *ex ante* regulatory intervention in order to discipline market power can only be justified in non-contestable networks, i.e., monopolistic bottleneck areas, where bundling in combination with irreversible costs is relevant.

The aim of future regulatory policy, however, should not be the global regulation of markets. Instead, only a disaggregated regulation of non-contestable networks is justified. The aim is then to localize the market power in monopolistic bottleneck areas and discipline this market power by regulatory intervention. Asymmetry of market power due to monopolistic bottleneck facilities, however, does not by itself require asymmetric regulation. Instead, the symmetry principle requires that all firms have access to local telecommunications networks on terms identical to those of the incumbent, i.e., non-discriminatory access. The symmetry principle demands that only bottleneck facilities are regulated, irrespective of whether the owner is the incumbent or a newcomer. Table Two summarizes the disaggregated location of market power.

Table Two: A Disaggregated Location of Market Power in Telecommunications Systems

	Competitive/ Contestable	Non-contestable (Monopolistic Bottleneck)
Terminal Equipment	X	—
Telecommunications Services (Including Voice Telephone Services)	X	—
Satellite/Mobile Networks	X	—
Long-Distance Cable Based Networks	X	—
Local Cable Based Networks	—	X

B. *The Fallacies of Asymmetric Regulation*

There is a wide range of possible asymmetric regulation. Whereas, in the past, legal entry barriers protected monopolistic carriers, the regulatory pendulum now seems to swing in the opposite direction. Asymmetric regulation in favor of newcomers is motivated by the conviction that, even after the abolishment of the legal monopoly, the incumbent carrier would still possess a factual monopoly position on the network infrastructure and the normal voice telephone service. Therefore, initial support of newcomers, at least for a sufficient transition period, has been recommended recently in the national regulatory debates[24] as well as on supranational level. For example, the Organization for Economic Cooperation and Development ("OECD"), arguing in favor of regulatory symmetry, i.e., competitive neutrality, in their Working Party on Telecommunication and Information Services Policies in April 1997,[25] issued an amendment in September 1997 in favor of asymmetric regulation: "This does not

24. *See, e.g.*, ERNST-JOACHIM MESTMÄCKER & EBERHARD WITTE, GUTACHTEN ZUR ZUSTÄNDIGKEIT FÜR DIE VERHALTENSAUFSICHT NACH DEM DRITTEN UND VIERTEN TEIL DES REFERENTENENTWURFS FÜR EIN TELEKOMMUNIKATIONSGESETZ (TKGE) [EXPERTISE ON THE RESPONSIBILITY FOR CONDUCT CONTROL ACCORDING TO THE THIRD AND FORTH PART OF THE PRELIMINARY VERSION OF THE GERMAN TELECOMMUNICATIONS ACT (TKG)] 12 (1995); Arnold Picot & Wolfgang Burr, *Regulierung der Deregulierung im Telekommunikationssektor* [Regulating Deregulation in Telecommunications], 48/2 SCHMALENBACHS ZEITSCHRIFT FÜR BETRIEBSWIRTSCHAFTLICHE FORSCHUNG 173 (1996).

25. *See* ORGANIZATION FOR ECONOMIC COOPERATION AND DEVELOPMENT, OECD WORKING PARTY ON TELECOMMUNICATION AND INFORMATION SERVICES POLICIES—UNIVERSAL SERVICE AND PUBLIC ACCESS IN THE TECHNOLOGICALLY DYNAMIC AND CONVERGING INFORMATION SOCIETY 11 (1997).

ignore the need and the importance of having asymmetrical regulation, even in liberalized markets, while effective competition is not widely established."[26] All asymmetric regulation, however, runs the risk of the regulators preserving existing competitors rather than the competition process.

III. *SYMMETRIC REGULATION OF MARKET POWER*

Designing a disaggregated regulatory approach focusing on network specific market power[27] can create a symmetric framework of regulation. Applying this theory to the ONP concept, the following lessons can be drawn.

- Stable network-specific market power in telecommunications systems can only be localized in local cable-based networks. In all other areas, including telephone services, satellite/mobile networks, or long-distance cable-based networks, active and potential competition does not allow for excessive profits. Even if market shares of incumbent firms were large, inefficient suppliers would lose their customers.
- As long as monopolistic bottlenecks are not involved, private bargaining solutions on interconnection conditions not only are beneficial to the carriers themselves, but also improve the market performance of the network services provided to the customers. Irrespective of the market size of the carriers involved, inefficient suppliers of interconnection services are rapidly confronted with strongly decreasing market shares due to the pressure of potential alternative network service providers.[28]
- Regulation of ONP conditions should be strictly limited to the monopolistic bottlenecks. The market power involved in monopolistic bottlenecks may seriously disturb the bargaining over access conditions.[29]

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26. *See* ORGANIZATION FOR ECONOMIC COOPERATION AND DEVELOPMENT, OECD WORKING PARTY ON TELECOMMUNICATION AND INFORMATION SERVICES POLICIES—CORRIGENDUM TO "UNIVERSAL SERVICE AND PUBLIC ACCESS IN THE TECHNOLOGICALLY DYNAMIC AND CONVERGING INFORMATION SOCIETY" 3 (1997).

27. *See, e.g.*, Günter Knieps, *Phasing out Sector-Specific Regulation in Competitive Telecommunications*, 50 KYKLOS 325 (1997).

28. *See* Part III.A.

29. *See* Part III.B.

A. *Unregulated Interconnection Among Contestable Networks*

Consider the case where interconnection/access requirements arise among contestable networks. One may think of a local community operating a mobile radio network and considering one or various opportunities for establishing a long-distance connection by microwaves, or of two specialized satellite networks to be connected. Other examples are the horizontal interconnection among different specialized value-added service networks of telecommunications or the vertical interconnection of a value-added service network into a microwave long-distance network.

1. Efficient Private Bargaining of Interconnection/Access Conditions

Potential competition performs the function of mitigating market power. It can be expected that private bargaining of interconnection/access conditions between the different network owners will lead to economically efficient solutions. Strategic behavior can be excluded because every bargaining partner can easily be substituted by a potential alternative network carrier due to competitiveness of networks.

Private bargaining solutions on interconnection conditions among contestable network carriers not only are beneficial for the carriers themselves, but also improve the market performance of the network services provided to the customers. Independent of the market size of the carriers involved, inefficient suppliers of interconnection services are rapidly confronted with strongly decreasing market shares due to the strong pressure of potential alternative network service providers. The rapidly changing U.S. market of computer and telecommunications equipment during the 1960s and 1970s indicated the enormous switching potential of the consumers.[30] Government regulation of such private bargaining processes would artificially disturb the bargaining process and automatically lead to inferior solutions.

2. Unregulated Interconnection/Access Tariffs

Carriers of contestable networks do not possess market

30. *See, e.g.*, FRANKLIN M. FISHER, ET AL., FOLDED, SPINDLED AND MUTILATED—ECONOMIC ANALYSIS AND U.S. V. IBM, A CHARLES RIVER ASSOCIATES STUDY (1983).

power due to the potential competition of alternative network carriers. Excessive interconnection/access charges, which allow monopoly rents or insufficient network service qualities, would immediately initiate switching to an alternative network carrier. There is no need for government interventions aiming to discipline market power of active network carriers if the underlying networks are contestable.

The question arises as to whether interconnection tariffs resulting from private bargaining can guarantee the viability of efficient providers of network capacities. Price regulations—with the aim of achieving interconnection tariffs according to long-run incremental costs, including fixed costs of capacity—would either be superfluous or would violate the viability of the incumbent carrier. In case of long-run incremental costs to private interconnection capacity being equal to stand-alone costs of interconnection facilities, cost-covering interconnection tariffs would be the result of private bargaining.[31] If common costs, i.e., overhead costs, between the interconnecting networks, play a significant role, then the problem of covering the difference between stand-alone costs and incremental costs arises because the sum of the incremental costs does not cover total costs. As a consequence, the network providers must have flexibility to raise interconnection tariffs such that the total cost covering constraint, i.e., viability condition, is fulfilled. In particular, they must be free to allocate common costs depending on the price elasticity of the relevant demand schedules. *Ex ante* allocations of overhead costs according to fully allocated cost principles, however, would be detrimental.[32] They neither would be based on the economically justified cost-causality nor take into account the demand side considerations. As a consequence, regulators who set interconnection rates on the basis of fully allocated costs may

31. Because the focus of this Essay is on analyzing regulatory problems of remaining market power after legal entry barriers within networks are abolished, we ignore the problem of cream-skimming (unsustainability) and the related discussion on re-establishing of legal entry barriers. *See, e.g.*, Gerald R. Faulhaber, *Cross-Subsidization: Pricing in Public Enterprises*, 65 AM. ECON. REV. 966 (1975); Manfred J. Holler, *Umstrittene Märkte und die Theorie der reinen Kosten* [*Contestable Markets and the Theory of Pure Costs*] *in* JOHAN M. GRAF VON DER SCHULENBURG & HANS W. SINN, THEORIE DER WIRTSCHAFTSPOLITIK—FESTSCHRIFT ZUM FÜNFUNDSIEBZIGSTEN GEBURTSTAG VON HANS MÖLLER [THEORY OF COMPETITION POLICY—PUBLICATION IN HONOR OF HANS MÖLLER] 146 (1990).

32. *See, e.g.*, BRUCE M. OWEN & RONALD BRAEUTIGAM, THE REGULATION GAME—STRATEGIC USE OF THE ADMINISTRATIVE PROCESS 212 (1978).

promote inefficient bypass activities, even when efficient, i.e., viable, market solutions exist.

Pricing rules enforced by regulatory agencies in order to allocate overhead costs cannot solve the problem. The most popular methods of pricing access are those that use the principle of fully distributed costs. For example, a proportional-sharing rule distributing the common costs among the complementary networks in proportion to the incremental costs, such that the relative markup is equal,[33] may create incentives for inefficient bypass of interconnection facilities. If, for example, the standalone costs of a specialized entrant for building a separate network were lower than the incremental costs of interconnection capacities plus the symmetrically allocated common costs, then private bargaining would result in lower markup requirements for the entrant. Nevertheless, the bargaining result would be efficient because the competitor also contributes to cover common costs. In contrast, a proportional-sharing rule induces inefficient cost duplications because it creates incentives for inefficient bypass of the entrant. In a similar way, it can be shown that the many other possible fully distributed cost principles may induce inefficient bypass activities as well.

In the context of unbundling of networks, William Baumol has proposed an access-pricing rule, called the "efficient component pricing rule."[34] Suppose that entrants supply a component in competition with the incumbent, for which, however, they need access to the incumbent's facility. This rule states that the efficient interconnection/access charges to the single-supplier's component will cover the incremental costs of this component plus the opportunity costs, which include any foregone revenues from a concomitant reduction in the single-supplier's sales of the complementary component. The basic idea behind this rule is that an entrant on the competitive segment should only enter if he is more efficient. For the case of contestable networks, however, an enforcement of the "efficient component pricing rule" is superfluous. Because excessive profits on the competitive part of the network do not exist, "opportunity costs" in the

33. *See, e.g.*, William B. Tye, *Pricing Market Access for Regulated Firms*, 29 LOGISTICS & TRANSP. REV. 39, 46 (1993).

34. *See* William J. Baumol, *Some Subtle Issues in Railroad Regulation*, 10 INT'L J. TRANSP. ECON. 341 (1983); WILLIAM J. BAUMOL & J. GREGORY SIDAK, TOWARD COMPETITION IN LOCAL TELEPHONY 94 (1994).

sense of foregone profits are zero, and subsequently interconnection/access tariffs automatically reflect real opportunity costs of network access, including congestion costs to use the single-supplier's component irrespective of who uses this facility. If common costs between different networks must also be covered, then the "efficient component pricing rule" may be interpreted to argue in favor of *pre-entry* allocation of common costs. As a consequence, incentives for inefficient bypass could be created, especially in situations where stand-alone costs of a specialized entrant would be below the sum of incremental costs and the portion of common costs attributed by the "efficient component pricing rule." In contrast, under such circumstances, private bargaining would result in lower markup requirements for the entrant. Again, the bargaining result would be efficient because the competitor also contributes to cover common costs without incentives for inefficient bypass.

B. *Regulation of Interconnection to Monopolistic Bottlenecks*

1. The Impact of Market Power on Bargaining of Interconnection/Access Conditions

In contrast to interconnection among contestable networks, the market power involved in non-contestable network infrastructures fundamentally disturbs such bargaining processes. One extreme alternative could be vertical foreclosure of competitors on a complementary service market. Such tying can be used as a method of price discrimination, enabling a monopolist to earn higher profits.[35] Another way of abusing market power within the bargaining process on interconnection/access conditions is to provide insufficient network access quality or excessive interconnection charges. An example of inferior access conditions is lower quality access to local telephone networks offered to competitive long distance-carriers. Monopolistic interconnection/access charges are another danger of the power of the non-contestable networks market.

2. Regulatory Instruments to Discipline Market Power

The "essential facility" doctrine seems to be an adequate

35. *See* RICHARD A. POSNER, ANTITRUST LAW: AN ECONOMIC PERSPECTIVE 171 (1976).

starting point for government interventions when market power is involved in interconnection/access processes. Well-known and often applied in U.S. antitrust law, the "essential facility" doctrine gains increasing importance also in European competition law.[36] The focus is on access on equal terms for all competitors to monopolistic bottlenecks. The "essential facility" doctrine has developed in the United States through the application of the Sherman Act.[37]

Liability under the "essential facility" doctrine is based on the following criteria: (1) control of an essential facility by a monopolist, i.e., endowing monopoly power; (2) a competitor's inability practically or reasonably to duplicate the facility; (3) the denial of the use of the facility to a competitor; and (4) the feasibility of providing the facility.[38] It is obvious that the preconditions of the "essential facility" doctrine are not fulfilled in the case of interconnection/access among contestable networks because competitors always possess access to potential alternative networks. There simply is no case of market power. If an incumbent carrier were to foreclose access or to behave in other aspects in a non-competitive way, then new network providers would arise automatically. In such a situation, the new network providers' emergence would not depend on the market share of the incumbent carrier. The application of the "essential facility" doctrine to interconnection/access among contestable networks would even be detrimental because it would artificially restrict

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36. *See, e.g.*, Daniel Glasl, *Essential Facilities Doctrine in EC Antitrust Law: A Contribution to the Current Debate*, 6 EUR. COMPETITION L. REV. 306 (1994).

37. The Sherman Act, 15 U.S.C. § 1 (1994), has two major provisions. Section 1 of the Sherman Act provides:

> Every contract, combination in the form of trust or otherwise, or conspiracy, in restraint of trade or commerce among the several States, or with foreign nations, is declared to be illegal. Every person who shall make any contract or engage in any combination or conspiracy hereby declared to be illegal shall be deemed guilty of a felony, and, on conviction thereof, shall be punished by fine not exceeding $10,000,000 if a corporation, or, if any other person, $350,000, or by imprisonment not exceeding three years, or by both said punishments, in the discretion of the court.

Id. Section 2 of the Sherman Act provides identical criminal sanctions for attempts or conspiracies to monopolize. "Every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons to monopolize any part of the trade or commerce among the several States, or with foreign nations, shall be guilty of a misdemeanour . . . ." *Id.* § 2.

38. City of Anaheim v. Southern California Edison Co., 995 F.2d 1373, 1380 (9th Cir. 1992).

degrees of freedom in the search for optimal bargaining solutions among the market participants.

As a consequence, the "essential facility" doctrine should be applied in a restrictive manner only to those interconnection/access cases where market power at least on one side is involved. In U.S. antitrust law, the "essential facility" doctrine has been applied in a case-by-case procedure to specific infrastructures, such as terminal railroads and local electricity networks of municipalities. In spite of the purpose of the "essential facility" doctrine to restrict monopoly power, interpretations of this doctrine by different U.S. courts varied over time. One controversial issue was whether the feasibility of providing the facility to a competitor would be an absolute criterion or whether valid business reasons would be a rationale for a refusal to deal with a direct competitor. This quite elusive interpretation can easily be criticized because, obviously, the fact that granting access would reduce the profit of the owner of the facility cannot by itself constitute a valid business reason.[39]

The proper application of the "essential facility" doctrine, however, does not imply demand-oriented unbundling. The "essential facility" doctrine is the tailor-made answer to a specific competition problem: the vertical integration between a competitive market and a complementary, monopolistic bottleneck area. The provision has two elements: (1) localization of the monopolistic bottlenecks as a factual finding, and (2) the right to access as a legal consequence. The purpose of the "essential facility" doctrine is to overcome the structural market entry barrier caused by vertical integration with a monopolistic bottleneck. A claim merely to access elements of the monopolistic bottleneck can therefore not be derived from the "essential facility" doctrine. Nor does this doctrine require the vertically integrated company to change its network in accordance with the wishes of its competitors on the market that is open to attack. The competitor must take the network as it is.[40]

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39. *See* William B. Tye, *Competitive Access: A Comparative Industry Approach to the Essential Facility Doctrine*, 8 ENERGY L.J. 337, 346 (1987).

40. *See* CHRISTOPH ENGEL & GÜNTER KNIEPS, DIE VORSCHRIFTEN DES TELEKOMMUNIKATIONSGESETZES ÜBER DEN ZUGANG ZU WESENTLICHEN LEISTUNGEN: EINE JURISTISCH-ÖKONOMISCHE UNTERSUCHUNG [THE PROVISIONS OF THE GERMAN TELECOMMUNICATIONS ACT CONCERNING THE ACCESS TO ESSENTIAL FACILITIES: A LAW AND ECONOMICS PERSPECTIVE] (1998).

The enforcement of the "essential facility" doctrine cannot be considered independently from the terms of access provided to the competitors. It is obvious that the effect of a total denial of access by refusing to offer a bundled and an unbundled rate can also be achieved by offering access on such burdensome terms that the foreclosure of competition would have the same effect.[41] An effective application of the "essential facility" doctrine must therefore be combined with adequate regulation of access conditions, such as quality and tariffs. Partly, this requirement has been included in the criteria of the "essential facility" doctrine itself. Not only the denial of the use of the facility, but also the imposition of restrictive terms for the use of the facility with the consequence of substantial harm to competition has been considered in earlier case law as a criterion for the "essential facility" doctrine.[42] Nevertheless, a significant scope for interpretation remains, especially given the historical fact that antitrust lawyers typically do not specialize in dealing with complex matters of access conditions.

As a consequence, enforcement of the "essential facility" doctrine should be combined with the application of regulatory instruments focusing on access conditions, especially regulation of interconnection/access charges. Another advantage of the explicit combination of regulatory concepts with the antitrust concept of the "essential facility" doctrine is the shift from case-by-case applications towards the definition of a class of cases characterized by non-contestable network infrastructures. In contrast, the rather global concept of the abuse of market power by dominant firms requires that, in a narrow sense, the relevant market be established and that the meaning of dominance be clarified.[43] Nevertheless, a generalization of the concept of the "essential facility" doctrine seems possible focusing on the class of cases where market power is based on the same reasons. Within networks, this leads to the non-contestable network infrastructures.

Similar to the case of interconnection among contestable networks, interconnection/access charges must cover not only

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41. *See, e.g.*, Tye, *supra* note 39, at 359.

42. *Id.* at 346.

43. *See* KEN GEORGE & ALEXIS JACQUEMIN, COMPETITION POLICY IN THE EUROPEAN COMMUNITY 206, 228 (W. Commanor ed., 1990).

long-run incremental costs, but also total costs of the monopolistic bottlenecks. Common costs to provide contestable and non-contestable networks must be covered by interconnection/access charges, without the owner of an "essential facility" being accused of the abuse of market power. If, however, the "efficient component pricing rule" was applied in such a manner that the monopolist's "opportunity costs" of providing access also included monopoly profits as part of its foregone opportunities in the contestable segment, then market power of the non-contestable network carrier would be cemented. The application of the "efficient component pricing rule" in this context would be anti-competitive because potential entrants in the complementary contestable networks would have to reimburse incumbents for their foregone monopoly rents. Such artificial "opportunity" costs should not be confused with real opportunity costs for the usage of scarce capacities of bottleneck facilities.[44]

A reference point for regulatory rules concerning interconnection/access charges should be the coverage of the full costs of the monopolistic bottleneck in order to guarantee the viability of the facility. In particular, when alternatives to bypass an "essential facility" are absent, the cost-covering constraint may not be sufficient to forestall excessive profits. Therefore, the instrument of price-cap regulation should be introduced.[45] Its major purpose is to regulate the level of prices, taking into account the inflation rate, i.e., consumer price index minus a percentage for expected productivity increase. It seems important to restrict such price-cap regulation to the non-contestable parts of networks where market power due to monopolistic bottleneck is really creating a regulatory problem. In other subparts of networks, price setting should be left to the competitive markets.

The question remains whether regulators should be also allowed to prescribe pricing rules that focus on tariff structures within monopolistic bottlenecks. There are serious arguments for regulators to refrain from detailed tariff regulation. First, firms should have the flexibility to design pareto-superior op-

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44. *See, e.g.*, Nicholas Economides & Lawrence J. White, *Access and Interconnection Pricing: How Efficient Is the "Efficient Component Pricing Rule?"*, 40 ANTITRUST BULL. 557 (1995) (arguing that if "Efficient Component Pricing Rule" is above marginal cost, then there will be economic distortion).

45. *See, e.g.*, Michael E. Beesley & Stephen C. Littlechild, *The Regulation of Privatized Monopolies in the United Kingdom*, 20 RAND J. ECON. 454 (1989).

tional tariff schemes.[46] Pricing rules prescribed by the regulator could induce inefficient bypass activities. For example, a first pricing rule could be to access tariffs according to long run average costs of the "essential facility." Because in such a case a differentiation among different user groups according to different price-elasticity is not possible, incentives for inefficient bypass of the bottleneck facility may be created for certain user groups. A second pricing rule would be to access pricing according to the Ramsey pricing principle.[47] Markups on the marginal costs of access to the monopolistic bottlenecks are chosen according to the elasticity of demand for network access in relation to social welfare given the cost-covering constraint. Ramsey prices could become unsustainable, however, even if strictly applied to monopolistic bottlenecks. The technological trend towards the unbundling of monopolistic bottleneck components increases the possibilities for inefficient bypass.

Second, the danger arises that regulators extend the regulatory basis, including the contestable subparts of networks. From the point of view of increasing static or short-run efficiency, such behavior could even be justified by welfare theory. It is well known that extending the regulatory basis can reduce efficiency distortions by applying Ramsey pricing. Nevertheless, such an endeavor would, in fact, mean a return to fully regulated networks, including price regulation and entry regulation of the contestable subparts. Such fully regulated networks would not be a suitable response to deregulation.[48]

In any case, regulators should not be allowed to intervene in the competitive price-setting process within the contestable subparts of networks. Otherwise the competition process within the contestable networks would be severely hampered. Regulation of interconnection/access conditions should be strictly limited to those parts of networks where market power has been localized. The design of pricing rules should be within the decision making process of the firms.

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46. *See, e.g.*, Robert D. Willig, *Pareto-Superior Nonlinear Outlay Schedules*, 9 BELL J. ECON. 56 (1978).

47. *See, e.g.*, William J. Baumol & David F. Bradford, *Optimal Departures from Marginal Cost Pricing*, 60 AM. ECON. REV. 265 (1970).

48. *See, e.g.*, Sylvester Damus, *Ramsey Pricing by U.S. Railroads—Can It Exist?*, 18 J. TRANSP. ECON. & POL'Y 51 (1984).

IV. *COSTING AND PRICING OF INTERCONNECTION SERVICES WITHIN THE ONP CONCEPT*

The German Telecommunications Act of July 25, 1996[49] requires the charges for interconnection and other special network access to be based on the cost of the efficient service provision. In the meantime, the Wissenschaftliches Institut für Kommunikationsdienste ("WIK") has developed a so-called "Analytical Cost Model" for the local network,[50] which is currently under critical debate.[51] In the following Section, I shall argue that the calculation of the costs of efficient service provision is a genuine entrepreneurial task and should not be taken over by regulatory agencies.

A. *The Role of Long-Run Incremental Costs in Determining Interconnection Prices*

It is well known that, even after complete entry deregulation, economies of scale and economies of scope create common costs that cannot be directly attributed to the individual network services. Although activity-based costing can help to identify the directly attributable costs to specific products, it is still not possible to declare all costs as incremental costs without applying economically unjustified allocation of common costs. Provided that the established network carrier is determining incremental costs based on decision-oriented accounting methods, it becomes immediately clear that the sum of the incremental costs does not allow survival. In fact, the established firm must also cover its product-group specific costs as well as the firm-specific overhead costs by means of markups on the long-run incremental costs

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49. Telekommunikationsgesetz [German Telecommunications Act], v. 1.8.1996 (BGBl. I S.1120) (F.R.G.). The German Telecommunications Act, in German and in English, is posted on the World Wide Web at the German Federal Ministry for Posts and Telecommunications' website. *See* German Federal Government, (visited Oct. 30, 1999), <http://www.bundesregierung.de> (on file with the *Fordham International Law Journal*).

50. WISSENSCHAFTLICHES INSTITUT FÜR KOMMUNIKATIONSDIENSTE, AN ANALYTICAL COST MODEL FOR THE LOCAL NETWORK—CONSULTATIVE DOCUMENT (1998) (prepared by Wissenschaftliches Institut für Kommunikationsdienste for Regulatory Authority for Telecommunications and Posts).

51. *See, e.g.*, Günter Knieps, *Der Irrweg Analytischer Kostenmodelle als Regulatorische Schattenrechnungen—Eine Kritische Analyse der Stellungnahmen zum WIK-Kostenmodell* [*The Fallacy of Bottom-up Cost Models—A Critical Analysis of the Comments to the WIK-Cost Model*], 11 MULTIMEDIA UND RECHT 598 (1998).

("LRIC"). In order to avoid inefficient bypass activities of entrants, the established carriers should raise market-driven markups. An obligation to provide the services according to LRIC, however, would disturb the symmetric treatment of an infrastructure owner and service provider. Incentives to be the owner of infrastructure for interconnection and network access would disappear because it would be cheaper to use the infrastructure of competitors and to avoid a contribution to the common costs. Symmetric treatment of owners and users of infrastructure therefore requires that the stand-alone costs of network infrastructure must be covered.

B. *Management Accounting Versus Pseudo-Data Models*

1. The Obsoleteness of Historical Cost Accounting

In competitive industries, the value of the firm's productive assets is equal to the discounted, i.e., present, value of the anticipated net cash flows earned by the assets over their remaining useful life. These net cash flows are determined by competitive market forces and the firm's actions, but are not influenced by book asset value. In regulated industries, however, the value of the firm's assets in place and the rate base has been strongly influenced by regulated depreciation charges. The regulatory agencies were under political pressure to keep down the local rates and, consequently, the capital costs of local networks. This pressure, in turn, caused artificially low depreciation charges and a very long lifetime without sufficiently considering technical progress, changed substitution possibilities, etc.

Although it is true that historical cost accounting is obsolete, the reform towards decision-relevant costing should still be based on management and financial accounting data. Management accounting approaches are based on real costing data, observing the relationship between input-prices, outputs, and the costs of production. In contrast, engineering-economic models, i.e., process analysis approaches, develop pseudo-cost data. After describing the production function from engineering data, the cost-output relationship is then derived as a result of assumed global optimization behavior. It shall be shown in the following section that, instead of engineering-economic models, an adequate reform of management accounting is needed, based on forward-looking cost accounting methods. Moreover, it should

become clear that the concept of an efficient network needs further elaboration. Whereas current cost accounting methods take into account, by their very nature and as long as it is efficient from a forward-looking perspective, the path-dependency of network evolution, engineering-economic models usually ignore the strategy of successive upgrading of networks.

2. The Fallacies of Pseudo Data Models in Determining Long-Run Incremental Costs

In the following, I shall argue that engineering-economic models are inadequate for determining the long-run incremental interconnection costs of interconnection services of established carriers. Process analysis is placed on simulating the production function from engineering data. After describing the production function, the cost-output relationship is then derived as a result of assumed optimization behavior. Instead of real accounting data, the cost-data developed by engineering-economic models are simulated, i.e., pseudo, data, their informational value strongly dependent on the quality and the characteristics of the underlying process model. Although the process analysis approach was not very popular for a long time,[52] it has also been applied in the field of telecommunications.[53] David Gabel and Mark Kennet developed the so-called Local Exchange Cost Optimization Model ("LECOM") in order to generate data to address the issue of economies of scope in local telephone networks.[54] With LECOM, it became possible to solve the problem of selecting the combination and location of facilities that minimized the costs of satisfying varying levels of demand.[55] The three types of facilities within the local exchange carrier's network are the local loop, switching, and trunking. The local loop is composed of facilities that provide signaling and voice transmission paths between a central office and the customer's station. The central office houses the switching computer that connects a customer's line either to another customer who is served

52. *See* James M. Griffin, *The Process Analysis Alternative to Statistical Cost Functions: An Application to Petroleum Refining*, 62 AM. ECON. REV. 47 (1972).

53. *See* DAVID GABEL & MARK D. KENNET, ESTIMATING THE COST STRUCTURE OF LOCAL TELEPHONE EXCHANGE NETWORK (1991).

54. *Id.*

55. *See* David Gabel & Mark D. Kennet, *Economies of Scope in the Local Telephone Exchange Market*, 6 J. REG. ECON. 381, 386-90 (1994).

by the same switch or to an inter-office trunk. Calls between central offices are carried on trunks. The model takes a city's dimensions and customer usage level as data. LECOM then searches for the technological mix, capacity, and location of switches that minimize the annual cost of production. The nonlinear optimization model optimizes the location of the switches.

In principle, there is an infinite number of possible configurations to be considered. For each economically and technically feasible combination of switches, a certain number of possible iterations are allowed. Iteration involves the calculation of the cost of service at one or more alternative locations for the switches. For each market and a given level of demand, LECOM evaluates a number of different switch combinations. In other words, LECOM has been designed to develop a green-field approach. Gabel and Kennet have already pointed out the important limitations of engineering optimization models.[56] First, optimization models typically are not designed to quantify the less tangible costs of providing service, such as administrative costs. Second, LECOM is limited by bounded rationality. Because global optimization is not feasible, only a reasonable number of possible solutions are examined. It is obvious that a great degree of freedom exists in the search for "plausible" solutions. Third, the value of the pseudo-data approach ultimately rests on the quality and completeness of the underlying process models. Measurement and behavioral errors still persist, even in the best model.[57]

Beyond this critique of engineering-economic models, the most important point is that they are simply the wrong tools for deriving the LRIC of established carriers. Even if the analysis is based on a "scorched node" assumption that implies that the incremental cost estimate reflects the current network topology, engineering-economic models—by their very nature—are not able to derive the LRIC of the efficient network of the established carrier. The reason is the path-dependency of networks. This result means that, given the network history, the gradual upgrading is efficient if the additional costs of upgrading are lower than the costs of building new network facilities. This cor-

56. *Id.*

57. James M. Griffin, *Long-Run Production Modeling with Pseudo-Data: Electric Power Generation*, BELL J. ECON. 125 (1977).

relation implies that the economically efficient incremental costs must be calculated on the basis of the factual costs of the incumbent's network in place, including its history of upgrading.

As long as the incremental costs of upgrading of the established carrier are lower than the stand-alone costs of a hypothetical new network of an entrant, the required network capacity should be provided by the historically grown network of the established carrier. This correlation is true because such entry would replace the service of the incumbent firm over its existing network, not the service of a hypothetical efficient provider. The path-dependent costs of gradual upgrading are then economically efficient as well as relevant from a forward-looking costing perspective.[58] Therefore, they also should not be confused with sunk costs because the upgrading strategy is then incentive-compatible, even if all investments could easily be shifted to another market, such as a perfect "second-hand" market. Under efficient upgrading strategies, the economic value of the existing network components is the only basis for decision-making. It is simply not in the spirit of the engineering-economic models to take into consideration this network history. Even under the scorched node assumption, engineering-economic models use the high degree of freedom of simulation models to find cost-minimizing solutions by ignoring the historically-grown network infrastructure that is already in existence.

Beyond this fundamental critique of the usefulness of engineering-economic models for determining the LRIC of the established carriers, other points of criticism have already been indicated in the studies by the National Economics Research Associates, Inc. ("NERA"), a New York-based economics consulting firm, for the Office of Telecommunications ("OFTEL"), the British regulatory agency.[59] In particular, the insufficient determination of the factual usage of network capacities and of the factual routing patterns has been stated.

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58. As long as upgrading is an efficient strategy, its costs should not be confused with phantom costs due to overvaluation of installed investment (based on differences between economic and historical depreciation patterns). *See* Part IV.B.3.

59. *See* NATIONAL ECONOMIC RESEARCH ASSOCIATES, THE METHODOLOGY TO CALCULATE LONG-RUN INCREMENTAL COSTS (1996); NATIONAL ECONOMIC RESEARCH ASSOCIATES, RECONCILIATION AND INTEGRATION OF TOP DOWN AND BOTTOM UP MODELS OF INCREMENTAL COSTS (1996); NATIONAL ECONOMIC RESEARCH ASSOCIATES, RECONCILIATION AND INTEGRATION OF TOP DOWN AND BOTTOM UP MODELS OF INCREMENTAL COSTS, FINAL REPORT (1996).

3. The Necessity of Reforming the Management Accounting: From Historical Cost Accounting to Current Cost Accounting

It is often argued that the necessary and overdue departure from historical cost accounting in a competitive environment can only be accomplished by introducing engineering-economic models. This argument is, however, particularly misleading because the necessary reform should still be based on management accounting. In the following, I shall argue that a transition from historical-cost accounting to forward-looking current cost accounting is unavoidable. Under competitive conditions, the valuation of the assets and the depreciation charges must reflect their economic values. The true economic value of any productive asset is the discounted present value of the anticipated stream of net earnings that it is capable to produce. Thus, the economic depreciation of a productive asset during a time period is the decrease in its economic value during this period. It should be noted that historical book values and depreciation patterns typically reflect neither capital market valuation of assets in place nor economic depreciation. Thus, a transition from historical cost accounting to current cost accounting necessarily poses the problem of phantom costs due to overvaluation of existing network equipment.[60] Phantom costs, however, should not be confused with economically efficient forward-looking costs of upgrading an existing network, i.e., path-dependency. A periodical reevaluation of the assets and an adaptation of economic depreciation rates seem unavoidable, especially in such dynamic markets as telecommunications.

60. HORST ALBACH & GÜNTER KNIEPS, KOSTEN UND PREISE IN WETTBEWERBLICHEN ORTSNETZEN [COSTS AND PRICES IN COMPETITIVE LOCAL NETWORKS] 31 (1997).